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United States Patent [19]

Kakizawa et al.

[11] **Patent Number:** **5,966,132**[45] **Date of Patent:** ***Oct. 12, 1999****[54] THREE-DIMENSIONAL IMAGE SYNTHESIS WHICH REPRESENTS IMAGES DIFFERENTLY IN MULTIPLE THREE DIMENSIONAL SPACES**

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[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: **08/596,236**[22] PCT Filed: **Jun. 16, 1995**[86] PCT No.: **PCT/JP95/01203**§ 371 Date: **Feb. 16, 1996**§ 102(e) Date: **Feb. 16, 1996**[87] PCT Pub. No.: **WO95/35139**PCT Pub. Date: **Dec. 28, 1995****[30] Foreign Application Priority Data**

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[51] Int. Cl.⁶ **G06F 15/62**[52] U.S. Cl. **345/419**[58] Field of Search **345/419, 421-2, 345/427, 429-31, 433-39, 114-15; 463/6, 31-34****[56] References Cited****U.S. PATENT DOCUMENTS**

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Primary Examiner—Mark R. Powell*Attorney, Agent, or Firm*—Oliff & Berridge, PLC**[57] ABSTRACT**

An objective of this invention is to provide a three-dimensional(3D) simulator apparatus that can form a sub-screen on a main screen, wherein the formation of the sub-screen does not greatly affect the formation of the main screen. A virtual three-dimensional(3D) space computation section (100) performs computations for forming first and second virtual three-dimensional(3D) spaces in which are placed display objects having different numbers of polygons but the same position or position and orientation. An image synthesis section (200) synthesizes a field-of-view image as seen from any desired viewpoint in these first and second virtual 3D spaces, on the basis of computation results from the virtual 3D space computation section (100). The field-of-view image of the first virtual 3D space is displayed as a main screen on a CRT (10), and a field-of-view image of the second virtual 3D space displayed as a sub-screen (rear-view mirror) that is formed on the main screen. Texture information for forming the main and sub-screens is used in common.

22 Claims, 26 Drawing Sheets**BEST AVAILABLE COPY**